XV. DIAGNOSES OF NEW SPECIES AND VARIETIES OF FRESHWATER CRABS. Nos. 1—3.

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No. 1.

In examining the Indian Museum collection of freshwater crabs (Potamonidæ) I have, so far, met with the following species and varieties of the subgenus *Potamon* that seem to be "new":—

1. *Potamon* (*Potamon*) *fluviatile*, Latreille, var. *gedrosianum*.

This variety agrees with the variety *ibericum* in all but the following particulars:—(*a*) The carapace is broader, its length in large adults seldom exceeding $\frac{3}{16}$ths of its breadth, owing to the greater convexity of the antero-lateral borders; (*b*) the cervical groove is deep-cut in all its course; (*c*) the epigastric crests are more tumid and more in advance of the post-orbital crests. It occurs in Baluchistán, Seistán, and the Salt Range of the Punjáb.

2. *Potamon* (*Potamon*) *atkinsonianum*, Wood-Mason, var. *emphyseteum*.

This variety agrees with Wood-Mason's type in all but the following particulars:—(*a*) The antero-lateral borders of the carapace are very strongly convex, this adds to the breadth of the carapace and makes the postero-lateral borders remarkably convergent, it also makes the ripple-like tubercles of the antero-lateral part of the epibranchial regions more oblique; (*b*) the sixth abdominal segment of the adult male is always two-thirds as long as broad, whereas in a series of *atkinsonianum* it is a variable amount less than two-thirds. It occurs in the Punjáb Himalayas, at Bilaspur and Kangra.

3. *Potamon* (*Potamon*) *atkinsonianum*, Wood-Mason, var. *ambivium*.

This small variety is annectant between *atkinsonianum* and Miss Rathbun's species, or variety, *kooloocnse*. Like the latter form it is small, the carapace of an egg-laden female being less than an inch long. It occurs at Dharampur, near Simla, 5,000 feet elevation.

4. *Potamon* (*Potamon*) *atkinsonianum*, Wood-Mason, var. *ventriosum*.

This variety agrees in every respect with Wood-Mason's type, except in the form of the male abdomen, which is broad, the sixth segment being twice as broad as long. It is represented by a single specimen, a large male with a carapace nearly two inches broad, from Kumâon, about 6,000 feet elevation. It is possibly an aberrant individual, not a "variety" in the strict sense of the term—if terms were always used in their strict sense.

5. *Potamon* (*Potamon*) *bifarium*, sp. nov.

Belongs to the *atkinsonianum* clan, and is distinguished from *atkinsonianum* by the following characters:—(*a*) The carapace is distinctly convex behind the frontal slope; (*b*) the epibranchial arcolæ are less distinct; (*c*) the abdomen of the adult male is broader, the sixth segment varying in length from almost half to two thirds the greatest breadth; (*d*) the legs are slenderer, for instance, in the second and third legs the propodite is two-and a-half times as long as broad. The species is represented by six males collected by Dr. W. T. Blanford either in Sikhim or in Burma.

6. *Potamon* (*Potamon*) *andersonianum*, Wood-Mason, var. *asperatum*.

Only differs from the type in having the entire carapace very finely granulous. The specimens are young and the character specified is variable. They come from Ganjam in the Cachar Hills, about 4,000 feet elevation,—not from Ganjam on the East Coast.

7. *Potamon* (*Potamon*) *andersonianum*, Wood-Mason, var. *manipurense*.

In this variety the surface sculpture of the carapace has a "worn" look, and the edge of the front is a little sinuous. A male and a female from the Manipur Hills.

8. *Potamon* (*Potamon*) *andersonianum*, Wood-Mason, var. *tritum*.

In this variety the surface sculpture is still more worn-looking, and the edge of the front is so sinuous as to suggest four faint lobes. A single female from the Kakhyen Hills, Upper Burma; in Dr. J. Anderson's Yunnan collection.

9. *Potamon* (*Potamon*) *edwardsi*, Wood-Mason, var. *hirtum*.

In this variety the tufts of bristly setæ on the dorsum of the carapace may be so numerous as to give the specimen a harsh woolly feel, and the legs are rather thickly hirsute. The pustule-like tubercles of the upper surface of the palm may be more

numerous and a little smaller. Nine males and three females from the Kakhyen Hills and Yunnan; in Dr. Anderson's Yunnan collection.

10. *Potamon* (*Potamon*) *pealianum*, Wood-Mason, var. *antennarium.*

In this "variety"—using the term without any definite implication—the antennular fossæ are wide fore and aft owing to an overgrowth of the epistomial portion of the inter-antennular septum. In consequence of this pushing up of the edge of the front the antennal peduncles stand quite clear of the front, being neither in contact with nor overlapped by the front. I find this abnormality in four old females only, two of them from Sibsagar, Assam, two from an unrecorded locality.

11. *Potamon* (*Potamon*) *turgidulum*, sp. nov.

Belongs to the *pealianum* and *tumidum* clan. Resembles *P. tumidum*, Wood-Mason, in form and size, but differs as follows:—(*a*) The grooves of the carapace are more superficial; (*b*) the front—in individuals of equal size—is narrower, and its edge is distinctly bilobed; (*c*) the edge of the post-orbital crests is thin and well defined, *not* thick and somewhat confused with the rugosities of the carapace as it is in *tumidum*; (*d*) the merus of the external maxillipeds is as long as broad; (*e*) the legs are longer—in individuals of equal growth—the second (longest) pair being considerably longer than the chelipeds. Eleven males and six females (one with eggs) from Burma. The length of the carapace in adults is less than an inch.

12. *Potamon* (*Potamon*) *tumidulum*, sp. nov.

Very close to *tumidum* and *turgidulum*, but the carapace is less convex, and the post-orbital crests are very rugose and blunt-edged. Though not so convex dorsally the carapace is hardly less deep, its depth being half its length. The front is less than a third the greatest breadth of the carapace in adults—in *turgidulum* it is a third, in *tumidum* more than a third. The chelipeds are more unequal, and they and the legs are somewhat hirsute. Eight males, eight females, and eight young from Pharping, Nepal. In the largest specimen (a mature female) the carapace is only ¾ths of an inch long. This species could not be placed in the *Geotelphusa* group as its post-orbital crests, though blunt-edged, are tumid and bold.

13. *Potamon* (*Potamon*) *simulum*, sp. nov.

Very close to *P. austenianum*, Wood-Mason, and having the same remarkably long, slender legs, but differing in the following particulars:—(*a*) The carapace is shorter and wider, and its areolation is much less distinct; (*b*) the front is much narrower—not

one-fourth the greatest breadth of the carapace—and is vertically deflexed.

A single female, with a carapace nearly 2 inches broad, from Burma.

14. *Potamon* (*Potamon*) *pruinosum*, sp. nov.

Belongs to the *P. larnaudii* clan, but differs from this and all other related species in the profusely tuberculous carapace. The carapace is deep—its depth equals half its length—and its grooves are very faint. The cervical groove does not cut the post-orbital crests. The surface of the frontal and of the anterior half of the gastric and epibranchial regions is covered with pearly granules and transverse dentiform tubercles of a brilliant whitish colour. Smaller pearly white granules stud the chelipeds. The edge of the epigastric and post-orbital crests is broken into long transverse and oblique whitish imbricating tubercles. Its nearest relative is *P. brevimarginatum*, de Man ; but it is more profusely and crisply and finely tuberculous than that species ; has a deeper carapace ; and, except for a very superficial and incomplete cervical groove, has no distinct areolation of the dorsum.

Locality.—Hills between Burma and Siam.

No. 2.

Potamiscus, gen. nov.

Potamiscus in one particular (namely, the absence of a flagellum from the exopodite of the external maxillipeds) resembles *Pseudotelphusa*; but it has no other affinities with that genus. Its closest relations are with the *Potamon fluviatile* group, as it has a simple mandibular palp—*i.e.*, a mandibular palp with the terminal joint not bifurcate—such as is found in *P. fluviatile*, *P. atkinsonianum*, *P. kooloocnse*, *P. andersonianum*, *P. edwardsi*, *P. hispidum*, *P. bifarium*, *P. pealianum*, *P. tumidum*, *P. turgidulum*, *P. tumidulum*, *P. austenianum*, *P. simulum*, *P. larnaudii*, *P. manii*, *P. brevimarginatum*, *P. stoliczkanum*, *P. thagatense*, *P.* (*Geotelphusa*) *sikkimense*, and *not* in any other Indian species. The value of the mandibular palp in classifying the Potamonidæ has lately been disclosed by Dr. W. T. Calman.

1. *Potamiscus annandalii*, sp. nov.

This species has a very strong superficial resemblance to *P. pealianum*, from which it is easily distinguished by the following characters:—

(1) the flagellum of the exopodite of the external maxillipeds is either quite vestigial or altogether wanting;

(2) the cervical groove is distinguishable only in the middle of the carapace, where it bounds the mesogastric areola posteriorly;

(3) the post-frontal and post-orbital crests form a continuous wavy curve from the middle line to the lateral epibranchial tooth,

as in the mixed assemblage of species to which the name *Potamonautes* has been applied.

In a large female the carapace is 1 inch long, $1\frac{1}{4}$ inch broad, and a little over $\frac{1}{2}$ an inch deep.

From Nemotha, Cachar; nine males and six females.

2. Varieties of *Potamon lugubre*, Wood-Mason.

This species is not a true *Potamon* (subgenus), since it has the terminal joint of the mandibular palp bifurcate or bilobed as in "*Potamonautes*" *jacquemontii*, "*Geotelphusa*" *lævis*, *Paratelphusa spinigera* and *Gecarcinucus jacquemontii*.

It is a very variable species. In the large series which I have examined I can distinguish five varieties (not including *P. masonianum* which seems to be but a variety) to some or all of which many naturalists, with only single specimens of each before them, might give specific rank. In none of these varieties, however, is there any constancy.

a. Potamon lugubre, var. *edentulum.*

In this variety the lateral epibranchial tooth is quite obsolete, the antero-lateral borders of the carapace are unusually convex, and the individual regions of the carapace are unusually tumid.

From the Naga Hills.

b. Potamon lugubre, var. *harpax.*

Though the carapace is flat on the whole, the individual regions are tumid, the amount of swelling being very variable: the carapace also is not quite so broad as in the type.

The lateral epibranchial tooth is usually more distinct, and the antero-lateral borders are often less arched than in the type.

The front is usually less deflexed.

The spine at the inner angle of the carpus is usually more acute.

In *some* large males the hand of the larger cheliped is enormously enlarged, the dactylus being much longer than the palm and strongly arched, so that when the fingers are closed only their tips are in contact and a very wide gap is left between them. In the female the fingers of both chelipeds are usually a little longer than in the type.

From Assam, Cachar, Sylhet, Khasi Hills, Garo Hills, and Naga Hills.

c. Potamon lugubre, var. *nigerrimum.*

As in the variety *harpax* the carapace is not quite so broad, the lateral epibranchial tooth is a spine, the individual regions of the carapace are tumid, the antero-lateral borders are less arched, and the front is less deflexed.

The colour is greenish-black to coal-black.
From North Lushai.

d. Potamon lugubre, var. *plautum.*

In comparison with the typical form of *P. lugubre*:—

The carapace is not quite so broad, and is unusually flat.

The lateral epibranchial tooth is usually more prominent, as in the variety *harpax.*

The front is less deflexed and the epigastric crests are more oblique.

The wings of the cervical groove are unusually broad.

The 6th abdominal segment of the male is slightly broader.

From Assam and the Khasi Hills.

e. Potamon lugubre, var. *falcidigitus.*

As in the three preceding varieties the carapace is not quite so broad and the front is less deflexed.

As in the variety *plautum* the carapace, in most individuals, is uncommonly flat, and the wings of the cervical groove are unusually broad.

As in typical *lugubre*, the lateral epibranchial tooth is small, indistinct, or obsolescent.

The chelipeds have the fingers remarkably broadened, so that although the upper border of the dactylus is quite as strongly curved as it is in typical *lugubre*, yet the fingers when closed are in contact, or almost so, along the whole extent of their cutting edge; but the breadth of the fingers is variable. Sometimes there is a row of two or three spines or large bead-like granules on the proximal end of the upper surface of the dactylus.

In all the legs the edges of the propodite are very strongly serrated, and the anterior edge of the carpus is also strongly serrated.

From Cachar, Cherra Punji, Khasi Hills, Garo Hills, and Naga Hills.

3. *Potamon napæum*, sp. nov.

The species differs from *P. lugubre* and *P. masonianum* (if this latter is anything more than a variety of the former) in the following characters, which are constant in five males and six females:—

The carapace has an oval outline, and the antero-lateral borders are well defined, slightly raised, and regularly beaded or crenulate.

There is no trace of a lateral epibranchial tooth, the antero-lateral borders at that point being in unbroken continuity with the post-orbital crests.

The sub-orbital lobes of the carapace are quite distinctly defined.

From Ganjam in North Cachar, 4,000 feet.

No. 3.

The Potamonidæ of the Indian fauna are included in three principal genera, *Potamon*, *Paratelphusa*, and *Gecarcinucus*.

In the genus *Potamon* the terminal joint of the mandibular palp is simple; the 6th segment of the abdomen of the adult male is short and broad, its length never being equal to its distal (least) breadth; and the cervical groove, when it is distinct, runs towards the external orbital tooth on either side.

In the genus *Paratelphusa* the terminal joint of the mandibular palp is bilobed, the anterior lobe (which is broadly oval) overhanging the ventral surface of the mandible, the posterior lobe (which is falciform) lying behind the incisor process; the 6th segment of the abdomen of the adult male is a longish joint, its length hardly ever being less, and usually being more, than its distal breadth; and the cervical groove when distinct usually runs towards the lateral epibranchial tooth on either side.

In the genus *Gecarcinucus* the terminal joint of the mandibular palp is bifurcate as in *Paratelphusa*; the 6th segment of the abdomen of the adult male is broad as in *Potamon*, but is narrowed distally in a way of its own; and the front is particularly narrow in the adult.

The Indian species of the genus *Potamon* can be grouped in four maniples or subgenera as follows:—

1. Subgenus *Potamon*. The antero-lateral borders of the carapace are crenulate or serrulate, not multispinous: there is no spine at the far end of the upper border of the merus of the chelipeds: the exopodite of the external maxillipeds carries a strong plumose flagellum: the post-orbital crests and lateral epibranchial spine of the carapace are well developed.—Type *Potamon fluviatile*, Latr.

2. Subgenus *Geotelphusa*. As *Potamon*, but the post-orbital crests and lateral epibranchial spine are ill-developed or obsolete.—Type *G. obtusipes*, Stimpson.

3. Subgenus *Potamiscus*. As *Potamon*, but the flagellum of the exopodite of the external maxillipeds is absent or vestigial.—Type *P. annandalii*, A. A.

4. Subgenus *Paratelphusula*, nov. As *Potamon*, but the antero-lateral borders of the carapace are cut into large teeth or spines, and there is a strong subterminal spine on the upper border of the merus of the chelipeds.—Type *P. dayana* (W.-M.).

[*N.B.*—The species of this subgenus of *Potamon* have been confused with *Paratelphusa* (type *P. tridentata*) which is a widely different form.]

The Indian species of the genus *Paratelphusa* can be grouped in six subgenera, as follows:—

1. Subgenus *Paratelphusa*. The antero-lateral borders of the carapace are usually cut into large teeth or spines, and there is always a strong subterminal spine on the upper border of the

merus of the chelipeds : the exopodite of the external maxillipeds carries a strong plumose flagellum.—Type *P. tridentata*, A. M.-Edw.

2. Subgenus *Leschenaultia*, nov. The antero-lateral borders of the carapace are *not* spinose : there is *no* subterminal spine on the upper border of the merus of the chelipeds : the epigastric crests of the carapace are in advance of and quite independent of the post-orbital crests : the exopodite of the external maxillipeds carries a strong plumose flagellum.—Type *L. hydrodromus* (Herbst).

3. Subgenus *Phricotelphusa*, nov. As *Leschenaultia*, but the flagellum of the exopodite of the external maxillipeds is either absent, or vestigial, or filamentous, or is inconstant in one and the same species ; and the antennal flagellum is minute or vestigial.—Type *P. callianira* (de Man).

4. Subgenus *Barytelphusa*, nov. As *Leschenaultia*, but the epigastric and post-orbital crests are either united to form a single ridge, or else are in the same line and are imperfectly separated only by a vague break : the cervical groove is usually very broad and very deep.—Type *B. jacquemontii* (= "*Telphusa indica*").

5. Subgenus *Liotelphusa*, nov. As *Leschenaultia*, but the epigastric and post-orbital crests are low and quite inconspicuous, and the lateral epibranchial tooth is small or obsolescent.—Type *L. lævis* (W.-M.).

6. Subgenus *Globitelphusa*, nov. As *Leschenaultia*, but the epigastric and post-orbital crests are still more inconspicuous than in *Liotelphusa*, the lateral epibranchial spine is obsolete, and the exopodite of the external maxillipeds is short and non-flagellate.—Type *G. bakeri*, A. A.

Certain new species of *Potamon* and *Potamiscus* have been briefly noticed in papers Nos. 1 and 2, the following new species of other subgenera may now be mentioned preliminary to the full diagnoses that will appear in my forthcoming report on the Indian Potamonidæ.

Genus Potamon.

Subgenus **Geotelphusa.**

Potamon (*Geotelphusa*) *adiatretum*, sp. nov.

This species is very closely related to *P. enode*, Kingsley, from which it differs chiefly in the bilobed front, and in the restriction of the cervical groove to that portion which bounds the mesogastric area posteriorly.

In an adult female the carapace is only $\frac{5}{8}$ inch long and $\frac{7}{8}$ inch broad.

From the Kakhyen Hills and Moulmein.

Subgenus **Paratelphusula.**

Potamon (*Paratelphusula*) *fungosum*, sp. nov.

This species comes nearest to *P. milne-edwardsi* (Wood-Mason) (= *P. wood-masoni*, Rathbun). It has the exposed surface of the

ischium of the external maxillipeds longitudinally grooved; the antero-lateral borders of the carapace cut into four salient spines, exclusive of the external orbital tooth; the carapace only slightly convex, broadly corrugated transversely (as in *P. fecæ*, de Man), and closely covered with a short spongy tomentum.

From Cachar.

Potamon (*Paratelphusula*) *calvum*, sp. nov.

The exposed surface of the ischium of the external maxillipeds is *not* grooved longitudinally; the antero-lateral borders of the carapace are cut into four spines, exclusive of the external orbital tooth; and the carapace convex.

It is closely related to *P. crenuliferum*, Wood-Mason, from which it chiefly differs in having a convex, somewhat orbicular carapace, with more spiniform lateral teeth.

From Upper Tenasserim.

Genus Paratelphusa.

Subgenus **Phricotelphusa.**

Paratelphusa (*Phricotelphusa*) *gageii*, sp. nov.

This species is allied to *P. callianira*, de Man, and *P. carinifera*, de Man, but more closely still to *P. elegans*, de Man. The carapace has the usual one pair of blunt epigastric crests: in the external maxillipeds the exopodite is as long as the ischium (which is longitudinally grooved) and is sometimes non-flagellate, and sometimes has a papillar or filiform (never plumose) flagellum: the lateral epibranchial tooth is small or obsolescent: the length of the 6th abdominal segment of the adult male is barely equal to its distal breadth: the antennal flagellum is small but distinct: and the anterior part of the front is vertically deflexed, but does not appear as a distinct facet as it does in *P. elegans*. Like all the species of this subgenus it is small.

From Sureil near Kurseong, where, thanks to the hospitality of Captain A. T Gage, I.M.S., Superintendent of the Botanical Gardens and of the Cinchona Plantations, I collected a fine series of this species.

Subgenus **Barytelphusa.**

Paratelphusa (*Barytelphusa*) *lamellifrons*, sp. nov.

Close to *P. jacquemontii*, Rathbun (= "*Telphusa indica*" of many authors), from which it chiefly differs in the form of the front and of the post-orbital crests. The front is a thin projecting plate far overhanging the epistome: the post-orbital crests are thin, elegantly crenulate, and have their outer ends lobe-like and continuous with the edge of the carapace just in front of the lateral epibranchial tooth.

From Travancore.

Paratelphusa (*Barytelphusa*) *pulvinata*, sp. nov.

Allied to *P. cunicularis*, but having a prodigiously convex carapace, a cervical groove deep-cut in all its course, and, in the adult male, a 6th abdominal segment the greatest breadth of which is barely two-thirds its length. There is no other Indian species of this subgenus that has such a narrow abdomen.

From Coorg and Ootacamund.

Paratelphusa (*Barytelphusa*) *pollicaris*, sp. nov.

This species is, in a way, transitional between *P.* (*B.*) *jacquemontii*, Rathbun, and *P.* (*B.*) *lugubris*, Wood-Mason. The carapace is squarish and flattish and about half of its antero-lateral border lies in front of the epibranchial tooth. The epigastric and post-orbital crests are continuous, the lateral epibranchial tooth is small and not prominent: the fingers of the chelæ are very broad, particularly the fixed finger.

From South India.

In my concluding preliminary paper I hope to give brief diagnoses of some new species of *Liotelphusa* and *Globitelphusa*.

I should like to mention here that the species and varieties of the "*Potamon lugubre*" group diagnosed in my paper No. 2 do not belong to the genus *Potamon* at all: "*Potamon lugubre*," Wood-Mason, belongs to the new subgenus *Barytelphusa* of the genus *Paratelphusa*, having the terminal joint of the mandibular palp bifurcated from the base, and the 6th abdominal segment of the adult male not much broader than long.